# Early Days

By Cherub Log

In 1935, the Royal Navy's most advanced method of detecting distant objects such as enemy ships and aircraft was 7 power binoculars. Four years later at the outbreak of World War 2, the new technology variously known to the British as RDF, Radio Direction Finding, Range and Direction Finding, Radio Location, and to the USA as Radio Echo Equipment, was capable of detecting aircraft up to 60 nautical miles distant. Later the allied forces used the common terminology of Radio Detection and Ranging, which became abbreviated to RADAR.

Radar was not invented. It was a progressive development of concepts in the UK, the USA, Germany, Japan, France and Italy over a period of perhaps 30 years. These developments focussed on the four main components of a Radar system, namely a radio transmitter with a pulse generator, an aerial array to send and to receive the electromagnetic pulses, a receiver to amplify and interpret the echo pulses, and an indicator such as a cathode ray oscilloscope to display the results for human interpretation.

In the early part of the 20th century, knowledge of developments in different countries was shared. A prime example is the Japanese developed Yagi directional aerial. However it became apparent that the knowledge being accumulated could be of vital security importance, and a veil of secrecy spread over the whole process in all of the technologically advaned countries from early 1930 onwards.

In February 1935 during British experiments, an aircraft was detected at a range of 8 miles as it was flying within the beam of the BBC's 50 metre short wave station at Daventry. Recognising the requirement to create high powered transmitters operating in the ultra shortwave spectrum, experimental work resulted in laboratory models which operated at 50 centimetres, and a magnetron valve capable of working at 36 centimetres. However, at this stage, these were a long way from being incorporated in operational equipment.

The RN required short wave equipment, because longer wave equipment meant longer and bigger aerial systems, which while suitable on land, were impractical in a ship. So the RN development focus was on equipment operating in the S, C and X bands, that is wavelengths between 3 and 30 centimetres. However, as shorter wavelength equipment was still very much in the development stage, the RN had to be content with the Type 79 until 1940 with the introduction of the type 281, followed by the type 271 in 1941. During this intervening period, the Type 79 under went a number of modicifations, improving its range, power output, and general capability.

The RN fundamental operational approach was that Radar should be used for early warning, and that the conventional range finding process of optical range finder would then be used to track and engage the target. To this end, the RN stated objective was to have Radar which would give early warning of aircraft at

60 miles and ships at 10 miles. Further that the Radar would provide precise location of aircraft at 10 miles and ships at 5 miles. However, with the rapid advances made in the technology, it wasn't long before Radar was used for a number of functions such as early warning of ships, early warning of aircraft, gun direction and conrol, navigation.

The first RN ships to be fitted with type 79 Radar were the battleship *Rodney* and the cruiser *Sheffield* in early 1938. *Sheffield* did trials and reported detecting aircraft 30 miles distant at 3,000 feet, 48 miles distant at 7,000 feet and 53 miles distant at 10,000 feet. By May 1939, improved transmitting valves improved these figures by an average of 33%.

It was about this time that Australia started to take an active interest in this new secret device.

Although the UK had an operational Radio Location system (aka RDF or Radio Direction Finding) in 1937, it wasn't until early 1939 that Australia took an active interest in this secret technology. Throughout all of 1939, there was much highly secret correspondence between such luminaries as Australia's High Comissioner to UK, Stanley Bruce, the two prime Ministers Joe Lyons (who died in 1939) and Robert G. Menzies, Australian cabinet ministers, senior officers of Australia's armed forces, and members of Australia's Radiophysics Board. A key person in this latter organisation was Dr. D.F.Martyn, D.Sc., Ph.D., A.R.C.Sc., F.R. Met.S., F.Inst. P., who was sent to UK to investigate and to report. In March 1939 Dr. Martyn sent a telegram to the PM Joe Lyons recommending that some of this RDF equipment should be purchased. The PM immediately authorised an order to be placed. One of the first recipients of the equipment was H.M.S. *Amphion*, destined to become H.M.A.S. *Perth*.

Following Dr Martyn's UK visit, a top level Australian government committee was formed to evaluate aspects of this new technology, Radio Location. The committee decided that a Radiophysics Laboratory should be established in the grounds of the University of Sydney. A further decision was that Australia should develop equipment as an alternative to relying on UK production and availability. These recommendations were fully supported by the Australian government, and steps were taken to implement the establishment of the required procedures. In broad terms, the Radiophysics Laboratory became responsible for the design and development of prototype equipment, for the training of senior personnel of the armed services and their respective support functions, and in providing training in the various scientific aspects of the operation of the equipment. The Post Master General's Department became responsible for advising the Radiophysics Board on the types of equipment required, and for the installation, operation and maintenance of the equipment.

The laws of supply and demand being no different for Radio Location than for any other commodity, coupled with Britain's preoccupation with the war in Europe meant that availability of equipment for the Australian armed forces was extremely limited. Thus the need for self sufficiency. To this end contracts were let to Amalgamated Wireless Australia (AWA), and to STC (Australia) for the

manufacture of units of Radio Location models, which soon became known as Radio Detection and Ranging, which in turn became truncated to RADAR.

For the RAN, one of the first sets produced was the A272 which did sea trails in HMAS *Kybra* in November 1942. In May 1944, an upgraded version of the A272, the A276, did sea trails in HMAS *Yandra*. (See separate article by PORM “Jake” Kerr on A272/A276 comparison)

Pre war *Yandra* and *Kybra* were small coastal steamers. Both were requisioned by the RAN, fitted with a 4 inch gun, depth charge equipment aft and port & starboard antiaircraft guns. Their prime role however was as training vessels for Radar operators, and for this they were equipped with type A286 forrard and aft, A272 forrard and aft, and E271 aft. The E271 was replaced by type A276. As well an A79 was fitted for the purpose of providing performance assessment for “Bailey Boys”. (See separate article on Bailey Boys)

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